UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 6
1445 ROSS AVENUE, SUITE 1200
DALLAS TX 75202-2733

JUL 02 2010

Mr. David Keith
Project Coordinator
Anchor QEA
2113 Government Street
Building D, Suite 3
Ocean Springs, MS 39654

RE: Comments on Draft Sampling and Analysis Plan Addendum, Chemical Fate and Transport Modeling Study, San Jacinto River Waste Pits Superfund Site

Dear Mr. Keith:

The U.S. Environmental Protection Agency (EPA) has completed its review of the *Draft Sampling and Analysis Plan Addendum, Chemical Fate and Transport Modeling Study* (dated May 2010) for the San Jacinto River Waste Pits Superfund Site.

Enclosed with this letter are EPA review comments for the purpose of the Unilateral Administrative Order for Remedial Investigation/Feasibility Study for this site.

Please address each review comment and feel free to contact me at (214) 665-8409, or by email at tzhone.stephen@epa.gov, if there are any questions or comments.

Sincerely,

Stephen L. Tzhone
Remedial Project Manager

Enclosure

cc: Ms. Ludmila Voskov, TCEQ
Ms. Jessica White, NOAA
Ms. Herminia Palacio, HCPHES

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EPA Comments on *Draft Sampling and Analysis Plan Addendum, Chemical Fate and Transport Modeling Study* (dated May 2010)

1) Explain how a grid of 15 to 30 m is appropriate to catch differences seen at transition areas (e.g., shorelines).

2) Sections 4.1, 4.2, 4.3, 5.3.1: List and describe types of high flow, storm event, flood event, and hurricane event data needed and where it will be obtained.

3) The chemical fate and transport model (QEAFATE) description alludes to covering colloidal interactions but did not discuss bioturbation in detail, this exchange mechanism is very important (see Lampert and Reible, 2009 capping model)

4) Is the Sedflume data being used to verify the SEDZLJ sediment transport model, or if not, what if the data conflicts with the model?

5) The approach suggests that these models can also be used to evaluate remediation alternatives, but no further description of the types of remediation were provided that would suggest the limits of such approach (i.e., removal vs. containment vs. treatment).

6) The hydrodynamic model description (EFDC) provided on page 7 does not list ground water recharge or discharge.

7) Hydrodynamic Model: Calibration for the hydrodynamic modeling includes measurements of current velocities for at least one (1) high-flow event (Section 5.3.1). A high-flow event is defined as an event with a flowrate of at least 10,000 cfs (Section 3.5.1). Per the subject report (Section 3.5.1), such an event is less than one-third the flowrate of a two-year return event. The TCEQ notes that model calibration based on flowrates from such a frequent return period may not allow significant extrapolation by the model to less frequent return periods.

8) Sediment Transport Model: Section 5.4.1 states that a total of 68 surface samples will be taken for the Bed Property Study. However, Figure 4 shows the locations of the surface samples, in which there are more than 68 locations. From these data, it is unclear how many surface samples will be collected and where their locations may be.

9) Sediment Transport Model: Section 5.4.1 states that the impoundment surface sediment also will be sampled. However, Figure 4 shows no sediment sampling at the location of the impoundment. The TCEQ considers the determination of the erodibility of impoundment sediments to be essential to any sediment transport modeling effort.

10) Sediment Transport Model: Section 5.4.3 states that the net sedimentation rates will be determined by age dating using radioisotopes. The TCEQ is concerned that samples obtained San Jacinto River Waste Pits from areas in a channel that is being actively dredged (for shipping) are not suitable for net sedimentation rate studies. Therefore, it is necessary to understand where dredging occurs in the Study Area. Additionally, it is also important to understand where dredging spoils may be deposited in the study area.

11) Sediment Transport Model: The possible effects of dredging in the San Jacinto River upstream of the Study Area may also affect the calibration of the sediment transport model in the most

dynamic section of the channel(s). The TCEQ requests some discussion regarding how the proposed modeling will account for the additional physical complexity introduced by the effects of possible nearby dredging.

12) Sediment Transport Model: Storm surge from recent major storms (e.g., Hurricanes Ike, Rita, and flood of October 1995) may also have complicated sedimentation history of this estuarine system. Such effects will further confound the model calibration process.

13) Chemical Fate and Transport Modeling: Calibration of chemical partitioning in sediment, whether equilibrium or disequilibrium, also can be confounded by the processes described with the Sediment Transport Model. Careful selection of appropriate calibration sample locations is essential and should be justified in the context of both the Hydrodynamic Model and the Sediment Transport Model.

14) Section 2.2 Statement of the Problem - The discussion indicates that the analysis of chemical fate and transport processes in the Study Area is needed to perform the evaluation of remedial alternatives during the Feasibility Study (FS). This seems rather limited. This information could be used for other purposes (i.e., to corroborate empirical measurements of site contaminants of potential concern (COPCs) throughout the system, to support the human and ecological risk assessments, and to provide a sensitivity analysis of expected COPC movement in future significant weather events).

15) Section 2.3 Primary Objectives of Modeling Study - Among other questions, the discussion on page 6 (last bullet) states that the chemical fate and transport model will be used to assess the effects of chemical concentrations in the surface-layer of the sediment bed have on total (i.e., dissolved and particle-associated) chemical concentrations in the water column. This question should be expanded to include the surface of the waste material as well as the sediment bed. Both could release dissolved and particle-associated COPCs and the expected behavior could be different.

16) Section 2.4 Contaminants of Potential Concern - Table 1 does not list PCBs as COPCs. Total PCBs are listed as secondary COPCs in the sediment SAP for human health (Table 9) and fish and wildlife (Table 11).

17) Section 4.3 Data Gaps and DQOs: Chemical Fate and Transport Model - The discussion on page 18 states that information regarding the "rate of temporal change of dioxin congener concentrations in the surface-layer of the sediment bed," is a data gap. The Respondents should consider that the same information does not exist for the change in concentrations in the surface-layer of the waste material.

18) Section 5.4.1 Bed Property Study - The introductory text mentions that as part of the SAP, a total of 68 surface sediment samples (0 – 10 cm) will be collected for characterization of Site and impoundment surface sediment (see Table 13 from the SAP) and that these samples will be analyzed for bulk bed properties (i.e., GSD, dry density) and these data will be used to develop inputs for the sediment transport model. Looking at Figure 4, there are no probing locations indicated within the preliminary site perimeter. So as far as the question of bed cohesiveness, it is not clear where bulk sediment analyses are proposed and why. Please clarify.

19) Section 5.4.4 Upstream Sediment Load Study - Figure 5 depicts the location of the upstream sediment load sampler. What is the basis for proposing this sample location and why is the proposal limited to one sampler?

20) Section 5.4.4 Upstream Sediment Load Study - The discussion indicates that the sampler will be serviced once every three days and decisions regarding analysis of total suspended sediment (TSS) concentration will be dictated by the occurrence of rainfall events during the 3-day period. What is the basis for the 3-day window? Is this simply a reflection of the holding capacity of the sampler (with 8 composites per day)?

21) Appendix A – Quality Assurance Project Plan for Sedflume Testing - There is a statement on page 7 as follows: "when non-cohesive sands are obtained at a given site, the core will be reconstructed in Sedflume cores." The Respondents should explain this statement, including the reliability of the "reconstructed" core to represent ambient conditions.

22) Figure 1: "Houston Shipping Channel" is not the name used in text. And is not recognized by the group.

23) Figure 2: Box for hydrodynamic model does not depict/include the "salt equations" or density-driven processes mentioned on page 8 of text.

24) References List: Citations on page 32 include "University of Houston and Parsons, 2008. Total maximum daily loads for dioxins in the Houston Ship Channel. Contract No. 582-6-70860, Work Order No. 582-6-70860-02. Quarterly report No. 3. Modeling Report – Revision 2. Prepared in cooperation with the Texas Commission on Environmental Quality and the U.S. Environmental Protection Agency. University of Houston and Parsons Water & Infrastructure." The correct date is 2006, need to edit the reference list citation.

25) Section 2.2: "…analyze the fate and transport of particle-associated chemicals within the Site and Study Area…". Study should not be limited to particle-associated chemicals. There needs to be some attention paid to dissolved transport, especially with regard to containment/remediation and the possible need for geosorbents. Granted, some apparently dissolved transport is likely to be on colloidal particles that pass through filters, but the issue remains that dissolved or colloidal transport might escape from containment adequate for sediment.

26) Section 3.1: "…sediment bed composition (i.e., relative amounts of clay, silt, and sand from different sources);…". Will sediment model track size classes separately, following each particle from point of origin, as this sentence seems to imply? Or does model track median particle size and statistically estimate size class distribution (which would not link back to "different sources")? How are "different sources" of particles tracked by model?

27) Section 3.1: Will particulate organic carbon (POC), total organic carbon (TOC), and/or dissolved organic carbon (DOC) be in the sediment and chemical models? Mention of partitioning implies yes, but not clearly stated. Whether or not explicitly mentioned in this plan, future review of work should assure that these organic parameters are included.

28) Section 3.1: "The sediment transport model predicts the transport and fate of inorganic sediment; the transport and fate of organic solids is not simulated by the model.". Then the "dissolved" fraction in the chemical fate model must simulate/include any organic solid transport of COPCs, whether dissolved, colloidal, or particulate.

29) Section 3.2.1, Hydrodynamic modeling: It is not clear where the lower boundaries of the hydrodynamic model are proposed to be. Figures imply somewhere in vicinity of Lynchburg Ferry, and Table 2 refers to the tide gauge at Battleship Texas. Section 4 implies the Battleship

gauge will provide "water surface elevation and salinity at the downstream boundary." There needs to be two boundaries at that area, one for the interface with the Buffalo Bayou branch (i.e. the main ship channel, segments 1006, 1007), and one for the interface with the lower San Jacinto River/HSC reach from Lynchburg to Galveston Bay (segment 1005, plus other "side bays"). Sea tides come up from Galveston Bay, and from the Lynchburg intersection can propagate both up the San Jacinto River and up the main channel (Buffalo Bayou branch). The Buffalo Bayou branch is really more like a "side stream boundary", it is not "downstream" from tidal perspective. Downstream river flow from the San Jacinto River ("north") can go both down channel toward Galveston Bay ("south") and up Buffalo Bayou ("west"), depending on how tide and flow interact at the 3-point Lynchburg intersection. Sediment also may be transported west, south, or north from there. The model should not combine west and south boundaries, or it could be misleading with regard to where water and transported load goes to or comes from. The water body or area called Old River is another complex detail. It provides a circular loop back to the San Jacinto channel adjacent to the 3-way intersection. Old River is clearly meant to be within the model domain (Figures 3 and 4), as it should be, but it cannot represent the main channel reach along Buffalo Bayou.

30) Section 4.1, Table 2: Because of lower boundary issues mentioned above, the hydrodynamic model could consider using the Morgan's Point tide gauge to represent the "south" boundary. Or, could develop some way to represent both lower boundaries based on the Battleship gauge. The Battleship tide gauge is near the "west" boundary in Buffalo Bayou.

31) Section 4.2: "High-flow events are the focus of a sediment load study because, typically, a majority of the annual load occurs during a small number of high-flow events.". This study should focus on the redistribution of "old" sediment already in the system, at least as much as on the annual load of "new" sediment entering the system. Other comments below address that the proposed "high-flow event" of 10,000 cfs for sampling purposes is not very high for the site. A 10,000 cfs flow in the SJR may not be a major annual loading event. Not clear if the statement on page 16 is about model simulation of larger events (>>10,000 cfs).

32) Section 4.2: "bed elevation change" is mentioned as information needed. Not clear if that is to include changes due to subsidence, past or present or future, as well as due to sediment dynamics. This draft does not say how long the model simulation periods will be (a few months? A few years? A few decades?), for either calibration or predictive simulations of future conditions.

33) Appendix A: "It can be seen in this plot that the surficial sediments erode easily at lower sediments, but at lower levels in the core the sediments are much more difficult to erode requiring much larger shear stresses.". First part of sentence does not make sense. Perhaps the highlighted word "sediments" was not the intended word…may have meant to say "shear stresses" or similar?

34) Appendix A: "…and average bulk properties will be plotted with binned depth.". Perhaps this refers to statistical "bins" for categorizing data, but it is not clear.

35) Appendix A: "Quality assurance objectives and results will be assuaged in the process of preparing the report.". Is 'assuaged' the intended word?

36) Appendix A: "…6 cores represents approximately on week in the field." Replace 'on' with 'one'.

37) Appendix A: "Coring locations will be chosen with the following tenants in mind:…". Replace 'tenants' with 'tenets'.

38) Appendix A: "…knowledge of sediment variability both aerially and with water depth…". Replace 'aerially' with 'spatially'.

39) Section 4.3: "…(Univ. of Houston and Parsons 2008)." That needs to be 2006 instead of 2008.

40) Section 4.3: Interpretation of radioisotope data from sediment cores to establish the age of sediment or rates of change seems to be a very subjective process. There will be a lot of uncertainty associated with net sedimentation rates and temporal change in dioxin/furan concentrations derived from such analyses, especially in relatively shallow and dynamic situations like the San Jacinto delta.

41) Section 5.3.1: "The mean flow rate in the San Jacinto River is 2,200 cfs, and high-flow events with return periods of 2, 10, and 100 years correspond to flow rates of 31,600, 107,000 and 329,000 cfs, respectively.". Cite the source of, or provide the basis for, these flow statistics.

42) Section 5.3.1: Plan proposes 10,000 cfs as defining a high-flow event for hydrodynamic monitoring purposes. Since the study plan anticipates two high-flow events during a month or so, and since the cited 2-yr event (31,600 cfs) is significantly larger than 10,000 cfs, the proposed high-flow events might be considered "slightly-higher-than-normal-flow events" in the scheme of river dynamics. Modeling should be able to simulate truly large high-flow events.

43) Section 5.3.1: "In the region upstream of the primary Study Area, a total of 15 cross-channel transects will be surveyed. In the region downstream of the primary Study Area, a total of 12 cross-channel transects will be surveyed as shown in Figure 3.". Transects marked on Figure 3 cross only the deep channel in upstream reach – how will bathymetry of the wide shallow areas be determined? Water and sediment move there also. There should be a lot of 3-ft by 3-ft grids in the model to cover the shallow water area.

44) Section 5.3.1: Transects downstream from Site: much of Old River is often covered by parked barges, getting the transect data may be more difficult than expected.

45) Section 5.3.1: Model lower boundary, vicinity of Lynchburg Ferry/De Zavalla Point: since the model needs two lower boundaries to separately characterize the "south" and "west" branches of channel (see Comment #29) some bathymetry to characterize those boundaries is needed.

46) Section 5.4.1.1: Sediment probing in Old River may be obstructed by parked barges. May need to define a procedure to use in case the "pre-programmed target coordinates" are under a group of barges. Also, not clear how the 6-inch interval markings on probe are read. Bottom will not be visible at most sites, so unlikely to read marks at sediment surface; water surface could index to markings, but not clear if depth to bottom will be consistent around a sample location.

47) Section 5.4.2: "The locations of these cores will be determined upon completion of the sediment bed probing study (see Section 5.4.1.1) and areas of cohesive bed sediments have been identified.". Does this indicate that non-cohesive bed sediments will not be included in the Sedflume study? Appendix A indicates that non-cohesive materials can be Sedflume tested.

48) Section 5.4.3: "(^{137}C)" needs 's' inserted after 'C' to represent cesium instead of carbon. Also, what if the anticipated cesium peak occurs within sub-sample interval that is not selected for analysis, e.g. 8 to 12 cm interval? What if true cesium peak has eroded away, leaving an apparent

peak that does not correspond to assumed 1963 date of peak? How could analyst tell the difference between these two possible situations?

49) Section 5.4.3: "Sub-samples will be submitted for laboratory analysis of ^{137}C and ^{210}Pb activity from every eighth sub-sample interval, starting with the 0 to 4 cm interval.". Sounds like second selected sub-sample would be from 32 to 36 cm interval. Is that correct interpretation? Seems like peaks might fall within untested intervals. Also, need to add 's' after 'C' to indicate cesium instead of carbon.

50) Section 5.5: Dioxin profiles in sediment may indicate an erratic "rate of temporal change," with increases and decreases in quick succession (as seen in profiles from nearby). Not clear how a synthetic average net rate of change would be used.

51) Section 2.1, Page 3, Site History states at the end of the first paragraph: "For the purposes of the modeling study, the Study Area is defined as the San Jacinto River from Lake Houston to the Houston Ship Channel (Figure 1)." It is highly probable that transport of chemicals of potential concern (COPCs) from the Site are beyond the intersection with the Houston Ship Channel, thus the Study Area should be extended farther downstream to the entrance of the Houston Ship Channel into Galveston Bay. We understand that other sources of COPCs are likely and thus monitoring and design of the study should take this into consideration while accurately assessing the extent of COPCs fate and transport downstream.

52) Section 2.1, Page 4, Site History makes reference in the final paragraph to "late successional stage estuarine riparian vegetation." During a Site visit, the Site seemed dominated by hackberry trees which are often considered pioneer or early successional stage trees in this portion of Texas. The basis for the characterization of the Site as having vegetation characteristic of a late successional stage should be validated to verify this description.

53) Section 3.1, Page 9, Description of Modeling Framework. Will any of the system of models account for movement in the water column and sediments due to boat turbulence?